Version with Markings to Show Changes Made

2. (Amended) A communications system according to Claim 1 wherein:

said LLD receive interface further includes at least one LLD status output;

wherein said PLD send interface further includes at least one PLD status input; and

further comprising at least one third communications channel connecting said at least one LLD status output to said at least one PLD status input.

3. (Amended) A communications system according to Claim 1 wherein:

said PLD further comprises a PLD receive interface including PLD parallel information inputs and at least one PLD control input; and

wherein said LLD further comprises an LLD send interface including LLD parallel information outputs and at least one LLD control output; and

further comprising third [fourth] communications channels connecting said LLD information outputs to respective PLD information inputs, and at least one [fifth] fourth communications channel connecting said at least one LLD control output with said at least one PLD control input so that said PLD and LLD are operable in a push-push configuration.

4. (Amended) A communications system according to Claim 3 wherein:

said PLD send interface and said LLD send interface are substantially identical; and

wherein said PLD receive interface and said LLD receive interface are [substantially identical] mirrored to thereby define symmetrical interfaces.

5. (Amended) A communications system according to Claim 3 wherein:

said PLD receive interface further includes at least one PLD status output; and

wherein said LLD send interface further includes at least one LLD status input; and

further comprising at least one [sixth] fifth communications channel connecting said at least one PLD status output to said at least one LLD status input.

6. (Amended) A communications system according to Claim 1 wherein:

said LLD comprises an asynchronous transfer mode (ATM) device.

7. (Amended) A communications system according to Claim 1 wherein:

said PLD comprises one of a synchronous optical network (SONET) device and a synchronous digital hierarchy (SDH) device.

8. (Amended) A communications system according to Claim 1 wherein:

said PLD send interface comprises a string-based framing coder for determining and appending a string-based framing code to each information symbol string of information symbol strings to be transmitted in parallel over respective first parallel communications channels, each string-base framing code being based upon at least some of the information symbols in the respective information symbol string; and

wherein said LLD receive interface comprises a deskewer for aligning received parallel information symbol strings based upon the string-based framing codes.

9. (Amended) A communications system according to Claim 8 wherein:

each information symbol comprises a binary bit; and

wherein said string-based coder comprises a cyclic redundancy checking (CRC) coder for determining and appending CRC codes to respective information bit strings.

10. (Amended) A communications system according to Claim 9 wherein:

said deskewer comprises a CRC framer for framing [the] said information bit strings based upon [the] said CRC codes.

11. (Amended) A communications system according to Claim 8 wherein:

said deskewer comprises:

a framer for framing information symbol strings based upon [the] said respective string-based framing codes; and

an aligner for aligning framed information symbol strings relative to one another and based upon [the] said string-based framing codes.

12. (Amended) A communications system according to Claim 11 wherein:

each information symbol comprise a binary bit; and

wherein said aligner comprises:

at least one first-in-first-out (FIFO) device connected to said framer for buffering framed information bit strings; and

a FIFO controller for aligning framed information bit strings during at least one of a writing and a reading phase of said at least one FIFO device and based upon [the] said string-based framing codes.

13. (Amended) A communications system according to Claim 1 wherein:

said first parallel communications channels are provided over electrical conductors.

14. (Amended) A communications system comprising:

a physical layer device (PLD) comprising a PLD send interface including PLD parallel information outputs, at least one PLD control output, and at least one PLD status input, [said PLD further comprising] a PLD receive interface including PLD parallel information inputs, at least one PLD control input, and at least one PLD status output;

a logical link layer device (LLD) comprising an LLD receive interface including LLD parallel information inputs, at least one LLD control input, [and] at least one LLD status output, [said LLD further comprising] an LLD send interface including LLD parallel information outputs, at least one LLD control output, and at least one LLD status input;

first parallel communications channels connecting said PLD information outputs to respective LLD information inputs;

at least one second communications channel connecting said at least one PLD control output to said at least one LLD control input;

at least one third communications channel connected said at least one LLD status output to said at least one PLD status input;

fourth parallel communications channels connecting said LLD information outputs to respective PLD information inputs;

at least one fifth communications channel connecting said at least one LLD control output to said at least one PLD control input; and

at least one sixth communications channel connected said at least one PLD status output to said at least one LLD status input.

15. (Amended) A communications system according to Claim 14 wherein:

said PLD send interface and said LLD send interface are [substantially identical] mirrored; and

wherein said PLD receive interface and said LLD receive interface are [substantially identical] mirrored to thereby define symmetrical interfaces.

16. (Amended) A communications system according to Claim 14 wherein:

said LLD comprises an asynchronous transfer mode (ATM) device.

17. (Amended) A communications system according to Claim 14 wherein:

said PLD comprises one of a synchronous optical network (SONET) device and a synchronous digital hierarchy (SDH) device.

18. (Amended) A communications system according to Claim 14 wherein:

said PLD send interface comprises a string-based framing coder for determining and appending a string-based framing code to each information symbol string of information symbol strings to be transmitted in parallel over respective first parallel communications channels, each string-based framing code being based upon at least some of the information symbols in [the] said respective information symbol string; and

wherein said LLD receive interface comprises a deskewer for aligning received parallel information symbol strings based upon [the] said string-based framing codes.

19. (Amended) A communications system according to Claim 18 wherein:

each information symbol comprises a binary bit; and

wherein said string-based coder comprises a cyclic redundancy checking (CRC) coder for determining and appending CRC codes to respective information bit strings.

20. (Amended) A communications system according to Claim 19 wherein:

said deskewer comprises a CRC framer for framing [the] said information bit strings based upon [the] said CRC codes.

21. (Amended) A communications system comprising:

a physical layer device (PLD) comprising a PLD send interface including PLD parallel information outputs and at least one PLD control output;

a logical link layer device (LLD) comprising an LLD receive interface including LLD parallel information inputs and at least one LLD control input;

first parallel communications channels connecting said PLD information outputs to respective LLD information inputs;

at least one second communications channel connecting said at least one PLD control output to said at least one LLD control input;

said PLD send interface further comprising a string-based framing coder for determining and appending a string-based framing code to each information symbol string of information symbol strings to be transmitted in parallel over respective first parallel communications channels, each string-based framing code being based upon at least some of [the] said information symbols in [the] said respective information symbol string;

said LLD receive interface further comprising a deskewer for aligning received parallel information symbol strings based upon [the] said string-based framing codes.

22. (Amended) A communications system according to Claim 21 wherein:

said PLD send interface and said LLD send interface are substantially identical; and

wherein said PLD receive interface and said LLD receive interface are [substantially identical] mirrored to thereby define symmetrical interfaces.

23. (Amended) A communications system according to Claim 21 wherein:

said LLD receive interface further includes at least one LLD status output;

wherein said PLD send interface further includes at least one PLD status input; and

further comprising at least one third communications channel connecting said at least one LLD status output to said at least one PLD status input.

24. (Amended) A communications system according to Claim 21 wherein:

said PLD further comprises a PLD receive interface including PLD parallel information inputs and at least one PLD control input; and

wherein said LLD further comprises an LLD send interface including LLD parallel information outputs and at least one LLD control output; and

further comprising fourth communications channels connecting said LLD information outputs to respective PLD information inputs, and at least one fifth communications channel connecting said at least one LLD control output with said at least one PLD control input so that said PLD and LLD are operable in a push-push configuration.

25. (Amended) A communications system according to Claim 24 wherein:

said PLD send interface and said LLD send interface are [substantially identical] mirrored; and

wherein said PLD receive interface and said LLD receive interface are [substantially identical] mirrored to thereby define symmetrical interfaces.

26. (Amended) A communications system according to Claim 25 wherein:

said PLD receive interface further includes at least one PLD status output; and

wherein said LLD send interface further includes at least one LLD status input; and

further comprising at least one sixth communications channel connecting said at least one PLD status output to said at least one LLD status input.

27. (Amended) A communications system according to Claim 21 wherein:

said LLD comprises an asynchronous transfer mode (ATM) device.

28. (Amended) A communications system according to Claim 21 wherein:

said PLD comprises one of a synchronous optical network (SONET) device and a synchronous digital hierarchy (SDH) device.

29. (Amended) A method for communicating between a physical layer device (PLD) and a logical link device (LLD), the method comprising the steps of:

sending information signals over first parallel communications channels from [the] said PLD to [the] said LLD; and

while sending control signals over at least one second communications channel from [the] said PLD to [the] said LLD so that control signals are sent from [the] said PLD to [the] said LLD out-of-band from information signals.

30. (Amended) A method according to Claim 29 wherein:

[the] said step of sending information signals over first parallel communications channels comprises the steps of:

operating a PLD send interface including PLD parallel information outputs; and

operating an LLD receive interface including LLD parallel information inputs.

31. (Amended) A method according to Claim 30 wherein:

[the] said step of sending control signals over at least one second communications channel comprises the steps of:

operating a PLD send interface including at least one PLD control output; and

operating an LLD receive interface including at least one LLD control input.

32. (Amended) A method according to Claim 29 further comprising the step of:

sending status signals over at least one third communications channel from [the] said LLD to [the] said PLD.

33. (Amended) A method according to Claim 32 wherein:

[the] said step of sending status signals over at least one third communications channel comprises the steps of:

operating a PLD send interface including at least one PLD status input; and

operating an LLD receive interface including at least one LLD status output.

34. (Amended) A method according to Claim 29 further comprising the steps of:

sending information signals over [fourth] third parallel communications channels from the LLD to the PLD; and

while sending control signals over at least one [fifth] fourth communications channel from [the] said PLD to [the] said LLD so that control signals are sent from [the] said PLD to [the] said LLD out-of-band from information signals.

35. (Amended) A method according to Claim 34 wherein [the] said step of sending information signals over [fourth] third parallel communications channels comprises the steps of:

operating an LLD send interface including LLD parallel information outputs; and

operating a PLD receive interface including PLD parallel information inputs.

36. (Amended) A method according to Claim 35 wherein [the] said step of sending control signals over at least one [fifth] fourth communications channel comprises the steps of:

operating an LLD send interface including at least one LLD control output; and

operating a PLD receive interface including at least one PLD control input.

37. (Amended) A method according to Claim [1]29 further comprising the step of sending status signals over at least one [sixth] third communications channel from the PLD to the LLD.

38. (Amended) A method according to Claim 29 further comprising the step of:

operating [the] said PLD and LLD in a push-push configuration.

39. (Amended) A method according to Claim 29 wherein:

[the] said PLD comprises a PLD send interface and [the] said LLD comprises an LLD send interface [substantially identical] mirrored to [the] said PLD send interface; and

wherein [the] said PLD comprises a PLD receive interface and [the] said LLD comprises an LLD receive interface [substantially identical] mirrored to [the] said PLD receive interface thereby define symmetrical interfaces.

40. (Amended) A method according to Claim 29 wherein:

[the] said LLD comprises an asynchronous transfer mode (ATM) device.

41. (Amended) A method according to Claim 29 wherein:

[the] said PLD comprises one of a synchronous optical network (SONET) device and a synchronous digital hierarchy (SDH) device.

42. (Amended) A method according to Claim 29 further comprising the steps of:

determining and appending a string-based framing code to each information symbol string of information symbol strings at [the] said PLD to be transmitted in parallel over respective said first parallel communications channels, each string-based framing code being based upon at least some of [the] said information symbols in [the] said respective information symbol string; and

deskewing received information symbol strings at [the] said LLD by aligning received parallel information symbol strings based upon [the] said string-based framing codes.

43. (Amended) A method according to Claim 42 wherein:

each information symbol comprises a binary bit; and

wherein [the] said step of determining and appending comprises determining and appending cyclic redundancy checking (CRC) codes to respective information bit strings.

44. (Amended) A method according to Claim 43 wherein:

[the] said step of deskewing comprises framing [the] said information bit strings based upon [the] said CRC codes.

45. (Amended) A method according to Claim 39 wherein:

[the] said step of deskewing comprises the step of:

framing information symbol strings based upon [the] respective string-based framing codes; and

aligning framed information symbol strings relative to one another and based upon [the] said string-based framing codes.

46. (Amended) A method according to Claim 45 wherein:

each information symbol comprises a binary bit; and

wherein [the] said step of aligning comprises the steps of:

buffering framed information bits in at least one first-in-first-out (FIFO) device; and

aligning framed information bit strings during at least one of a writing and a reading phase of [the] said at least one FIFO device and based upon [the] said string-based framing codes.

47. (Amended) A method according to Claim 29 wherein:

[the] said first parallel communications channels are provided over at least one electrical conductor.

48. (Amended) A method for communicating between a physical layer device (PLD) and a logical link device (LLD), the method comprising the steps of:

sending information signals over first parallel communications channels from [the] said PLD to [the] said LLD, and while sending control signals over at least one second communications channel from [the] said PLD to [the] said LLD so that control signals are sent from [the] said PLD to [the] said LLD out-of-band from information signals;

determining and appending a string-based framing code to each information symbol string of information symbol strings at [the] said PLD to be transmitted in parallel over respective said first parallel communications channels, each string-based framing code being based upon at least some of [the] said information symbols in [the] said respective information symbol string; and

deskewing received information symbol strings at [the] said LLD by aligning received parallel information symbol strings based upon [the] said string-based framing codes.

49. (Amended) A method according to Claim 48 wherein:

each information symbol comprises a binary bit; and

wherein [the] said step of determining and appending comprises determining and appending cyclic redundancy checking (CRC) codes to respective information bit strings.

50. (Amended) A method according to Claim 49 wherein:

[the] said step of deskewing comprises framing [the] said information bit strings based upon [the] said CRC codes.

51. (Amended) A method according to Claim 48 wherein:

[the] said step of deskewing comprises the steps of:

framing information bit strings based upon [the] said respective string-based framing codes; and

aligning framed information bit strings relative to one another and based upon [the] said string-based framing codes.

52. (Amended) A method according to Claim 51 wherein:

each information symbol comprises a binary bit; and

wherein [the] said step of aligning comprises the steps of:

buffering framed information bits in at least one first-in-first-out (FIFO) device; and

aligning framed information bit strings during at least one of a writing and a reading phase of [the] said at least one FIFO device and based upon [the] said string-based framing codes.

53. (Amended) A method according to Claim 48 wherein:

[the] said steps of sending information signals over first parallel communications channels comprises the steps of:

operating a PLD send interface including PLD parallel information outputs; and

operating an LLD receiver interface including LLD parallel information inputs.

54. (Amended) A method according to Claim 48 wherein:

[the] said step of sending control signals over at least one second communications channel comprises the steps of:

operating a PLD send interface including at least one PLD control output; and

operating an LLD receive interface including at least one LLD control input.

55. (Amended) A method according to Claim 48 further comprising:

[the] said step of sending status signals over at least one third communications channel from [the] said LLD to [the] said PLD.

56. (Amended) A method according to Claim 55 wherein:

[the] said step of sending status signals over said at least one third communications channel comprises the steps of:

operating a PLD send interface including at least one PLD status input; and

operating an LLD receive interface including at least one LLD status input.

57. (Amended) A method for communicating between a physical layer device (PLD) and a logical link device (LLD), the method comprising [according to Claim 56 further comprising] the steps of:

sending information signals over first parallel communications channels from said PLD to said LLD, and while sending control signals over at least one second communications channel from said PLD to said LLD so that control signals are sent from said PLD to said LLD out-of-band from information signals;

determining and appending a string-based framing code to each information symbol string of information symbol strings at said PLD to be transmitted in parallel over respective first parallel communications channels, each string-based framing code being based upon at least some of said information symbols in said respective information symbol string;

deskewing received information symbol strings at said LLD by aligning received parallel information symbol strings based upon said string-based framing codes;

sending information signals over [fourth] third parallel communications channels from [the] said LLD to [the] said PLD; and

while sending control signals over at least one [fifth] fourth communications channel from [the] said PLD to [the] said LLD so that control signals are sent from [the] said PLD to [the] said LLD out-of-band from information signals.

58. (Amended) A method according to Claim 57 wherein:

[the] said step of sending information signals over [fourth] third parallel communications channels comprises the steps of:

operating an LLD send interface including LLD parallel information outputs; and

operating a PLD receive interface including PLD parallel information inputs.

59. (Amended) A method according to Claim 58 wherein:

[the] said step of sending control signals over at least one [fifth] fourth communications channel comprises the steps of:

operating an LLD send interface including at least one LLD control output; and

operating a PLD receive interface including at least one PLD control input.

60. (Amended) A method according to Claim 59 further comprising the step of:

sending status signals over at least one [sixth] fifth communications channel from [the] said PLD to [the] said LLD.

61. (Amended) A method according to Claim 48 wherein:

[the] said LLD comprises an synchronous transfer mode (ATM) device.

62. (Amended) A method according to Claim 48 wherein:

[the] said PLD comprises one of a synchronous digital network (SONET) device and a synchronous digital hierarchy (SDH) device.

63. (Amended) A method according to Claim 48 wherein:

[the] said first parallel communications channels are provided over at least one electrical conductor.

REMARKS

Claims 2-63 are amended herein. Claims 1-63 are pending in the application.

Allowable Claims

The Applicants thank the Examiner for the indication that claims 14, 16-20 and 57-60 recite allowable subject matter.

Claim 57 is amended herein to be in independent form. Claims 14, 16-20 and 57-60 are now in condition for allowance.

In the Drawings

Fig. 5 was objected to as allegedly not being labeled as prior art.

A proposed drawing correction is attached hereto designating Fig. 5 as prior art.

Approval of the proposed correction and withdrawal of the objection is respectfully requested.

Double Patenting of claims 2 and 32

Claims 2 and 32 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting. In particular, claims 2 and 32 were rejected as allegedly obvious in view of claim 22 of co-pending Application No. 09/459,439.

A terminal disclaimer is being filed with this Amendment. The Applicants respectfully request the provisional rejection be withdrawn.

35 USC 101 Rejection of Claims 1, 3-13, 21-31, 33-56 and 61-63

Claims 1, 3-13, 21-31, 33-56 and 61-63 were provisionally rejected under 35 USC 101. In particular, claims 1, 3-13, 21-31, 33-56 and 61-63 were rejected as allegedly claiming the same invention of that of claim 22 of co-pending Application No. 09/459,439.

Claims 1, 3-13, 21-31, 33-56 and 61-63 of this application further recite, e.g., control signals that are sent from a PLD to an LLD out-of-band from information signals. This Application does not claim the same invention as alleged by the Office Action, but includes at least the non-obvious recitation of control signal that are out-of-band from information signals.

The Applicants respectfully request the 35 USC 101 rejection of claims 1, 3-13, 21-31, 33-56 and 61-63 be withdrawn.

35 USC 112 Second Paragraph Rejection of Claims 3-5, 7, 15, 34, 37, 39, 45 and 46

The Office Action rejected claims 3-5, 7, 15, 34, 37, 39, 45 and 46 as allegedly being indefinite under 35 USC 112.

In particular, claims 3, 5, 34, 37, 45 and 46 were rejected as claiming a fourth and sixth channel and allegedly failing to claim a third and fifth channel. Claims 3, 5, 34 and 37 have been reviewed and are amended where appropriate. Claims 45 and 46 fail to recite a fourth and sixth channel.

In particular, claim 7 allegedly is unclear if both devices or a selection of one device is meant by the claim. The claim recites one of a SONET device and a SDH device. The claim language is clear in that either of the two claimed devices conform to the claim limitation.

In particular, claims 4, 15 and 39 are allegedly unclear as claiming the phrase "substantially identical". Claims 4, 15 and 39 have been reviewed and are amended where appropriate.

In particular, claim 45 allegedly lacks antecedent basis. Claim 45 has been reviewed and is amended where appropriate.

In particular, claim 14 is allegedly awkward and confusing. Claim 14 has been reviewed and is amended where appropriate.

It is respectfully submitted that claims 3-5, 7, 15, 34, 37, 39, 45 and 46 are in full conformance with 35 USC 112. It is respectfully requested that the rejection be withdrawn.

Claims 1, 6, 7, 29-31, 38, 40, 41 and 47 over Rich in view of Akata

In the Office Action, claims 1, 6, 7, 29-31, 38, 40, 41 and 47 were rejected under 35 U.S.C. §103(a) as allegedly being obvious over Rich, U.S. Patent No. 5,784,370 ("Rich") in view of Akata et al., U.S. Patent No. 5,594,724 ("Akata"). The Applicants respectfully traverse the rejection.

Claims 1, 6, 7, 29-31, 38, 40, 41 and 47 recite, *inter alia,* control signals that are sent from a physical layer device (PLD) to a logical link device (LLD) out-of-band from information signals.

Rich appears to disclose an extender circuit that provides a serial communication interface between an ATM layer and a PHY layer (Abstract). An ATM interface is comprised of a parallel interface circuit and serial interface circuit (Rich, Fig. 3). A PHY interface is comprised of a parallel interface circuit and serial interface circuit (Rich, Fig. 3). The ATM serial interface circuit communicates with the PHY serial interface circuit through a serial communication path (Rich, Fig. 3).

The Office Action correctly acknowledged that Rich fails to disclose an out-of-band channel for control signals (Office Action, page 6). However, the Office Action relies on Akata to allegedly make up for the deficiencies in Rich to arrive at the claimed invention. The Applicants respectfully disagree.

Akata appears to disclose a transmission convergence sublayer multiplex generating apparatus that includes ATM transmission convergence sublayers calculating section (Abstract). A TC layer multiplex generating apparatus allows a single STM1 generating apparatus to replace multiple STM1 generating apparatus by accommodating a plurality of low-speed lines or an interface between an ATM switch and SDH transmission equipment (Akata, col. 6, lines 19-23).

Neither Rich nor Akata even mention use of out-of-band communications, much less between a PLD and an LLD. Neither Rich nor Akata, either alone or in combination, disclose, teach or suggest control signals that are sent from a physical layer device (PLD) to a logical link device (LLD) out-

of-band from information signals, as recited by claims 1, 6, 7, 29-31, 38, 40, 41 and 47.

Accordingly, for at least all the above reasons, claims 1, 6, 7, 29-31, 38, 40, 41 and 47 are patentable over the prior art of record. It is therefore respectfully requested that the rejection be withdrawn.

Conclusion

All objections and rejections having been addressed, it is respectfully submitted that the subject application is in condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,
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